

Agenda for 6th Standing Committee Meeting on Power System planning of North Eastern Region

1.0 Confirmation of the minutes of 5th Standing Committee Meeting on Power System planning of North Eastern Region.

1.1 The minutes of the 5th meeting of the Standing Committee on Power System Planning held on 08th Aug., 2015 at Imphal, Manipur were circulated vide CEA letter no. 81/4/2015/SP&PA/70-87 dated 28th Aug., 2015. Subsequently, a corrigendum was issued vide letter of even no. dated 23-09-2015 based on the comments received from MePTCL.

1.2 Members are requested to confirm the minutes of the meeting along with the corrigendum.

2.0 LILO of one circuit of 132kV Biswanath Chariali (PG) – Itanagar at Gohpur – Agenda by Assam / NERLDC

2.1 AEGCL vide letter no. AEGCL/MD/13th Plan/Tech-593/2014-15/6 dated 5th Aug., 2016 has informed that Biswanath Chariali (PG) – Pavo (AEGCL) 132kV D/C line is meeting the loads in Pavo, Gohpur and Depota areas of Assam. It has been observed that this line is carrying more than 135MW during peak hours.

2.2 Studies have been carried out for 2018-19 time-frame for both high hydro (Exhibits-1) and low hydro (Exhibits-2) conditions, considering Sonabil 220/132kV substation and Sonabil – Dhemaji – Behiating 220kV D/c line (one circuit of Sonabil-Dhemaji line via Narayanpur) (under construction by AEGCL) and Behiating - Tinsukia 220kV D/c line (under NERPSIP).

2.3 The study results are at **Exhibit-1(A) & 2(A)**. Studies have been carried out considering the split bus at Gohpur as closed. It has been observed that with the LILO of one circuit of 132 kV Biswanath Chariali (PG) – Itanagar D/c line at Gohpur, the power flow on the Biswanath Chariali (PG) – Pavo (AEGCL) 132kV D/c line gets reduced by about 30MW [**Exhibit-1(B) & 2(B)**].

2.4 It is thus proposed to LILO one circuit of Biswanath Chariali (PG) – Itanagar 132kV D/c line at Gohpur to satisfy N-1 criterion and to improve security and reliability of the grid.

2.5 Members may discuss.

3.0 Strengthening of evacuation system of Pare HEP of NEEPCO

3.1 Power evacuation system from Pare HEP (2x55 MW), which is expected to be commissioned in Dec 2016, consist of the following:

- a) LILO of Ranganadi – Naharlagun / Nirjuli 132kV S/c line at Pare HEP by NEEPCO.
- b) LILO of one circuit of Ranganadi – Itanagar 132kV D/c line at Pare HEP by NEEPCO.

- 3.2 From above, it is seen that out of four 132 kV lines from Pare HEP, two are connected to Ranganadi HEP and two to the load centres viz. Naharlagun and Itanagar. System studies carried out in 2018-19 time-frame indicate that Ranganadi HEP injects power at Pare HEP through Pare – Ranganadi 132kV 2xS/c lines, thereby leaving only 2 no. 132kV S/c line sections i.e. Pare – Itanagar and Pare – Naharlagun / Nirjuli for evacuation of 110MW power from Pare HEP and additional power injected at Pare HEP from Ranganadi HEP. This causes overloading of Pare – Naharlagun / Nirjuli 132kV S/c line (Pare – Naharlagun: 129MW, Naharlagun – Nirjuli: 91MW) [**Exhibit-1(A)**].
- 3.3 Thus, in order to address the issue of power evacuation from Pare HEP, it is proposed to disconnect LILO of Ranganadi HEP – Naharlagun / Nirjuli 132kV S/c line from Pare HEP and utilize LILO line section to construct Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (high capacity) [**Exhibit-1(C)**]. From the study result, it is seen that the power is reliably evacuated from Pare HEP, however the loading in the Ranganadi – Naharlagun line still remains on the higher side (92MW).
- 3.4 Further, it may be observed from Exhibit-1 (C) that, though the loading on Biswanath Chariali (PG) – Pavoi (AEGCL) 132kV D/c line is reduced by about 20MW with construction of Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (high capacity), keeping in view the future load growth in Upper Assam, it is proposed to implement both the schemes viz. LILO of one circuit of Biswanath Chariali (PG) – Itanagar 132kV D/c line at Gohpur and Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (high capacity). Study results are enclosed at **Exhibit-1(D)**.
- 3.5 As mentioned above, Ranganadi – Naharlagun 132kV S/c line is critically loaded as the combined load of about 70MW of Naharlagun and Nirjuli is fed from this line. Further, some demand of Gohpur is also fed through this line. Thus, it is proposed to LILO one circuit of Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (high capacity) at Nirjuli. Study results are enclosed at **Exhibit-1(E)**.
- 3.6 In view of the above, following is proposed to be implemented:
- (i) Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (with ACSR Zebra conductor) – through TBCB (ISTS)
 - (ii) LILO of one circuit of Pare HEP – North Lakhimpur (AEGCL) 132kV D/c line (with ACSR Zebra) at Nirjuli substation – through TBCB (ISTS)
 - (iii) Reconductoring of LILO portion at Pare end (of Ranganadi – Naharlagun / Nirjuli 132kV S/c line) with HTLS (HTLS equivalent to ACSR Zebra) along with modification of 132kV bay equipments at Pare HEP – by NEEPCO.
 - (iv) To bypass LILO of Ranganadi- Naharlagun / Nirjuli at Pare HEP so as to form direct Ranganadi- Naharlagun / Nirjuli 132 kV S/C line.

3.7 Members may discuss.

4.0 Augmentation of 2x30MVA, 220/132kV substation at Mokokchung (PG)

- 4.1 2x30MVA, 220/132kV Mokokchung (PG) substation is a vital node through which power from Mariani (PG) (in Assam) is fed to Mokokchung & other downstream areas of Nagaland through Mariani (PG) – Mokokchung (PG) 220kV D/C line.
- 4.2 POWERGRID has informed that maximum loading observed on 2x30 MVA ICTs is 32 MW. Under N-1 contingency of ICT at Mokokchung the other ICT would be over loaded and loading has to be restricted to 30 MW.
- 4.3 In view of the above, it is proposed to enhance the transformation capacity at Mokokchung (PG) by installation of third 220/132 kV ICT of 30MVA (3x10MVA) single phase units.

4.4 Members may discuss.

5.0 Conversion of 2 nos. 63 MVAR Line Reactors at Bishwanath Chariali end of Biswanath Chariali – Lower Subansiri 400kV (1st) D/c line to Bus Reactors

- 5.1 4 nos. 420kV, 63MVAR line reactors, originally envisaged for use as Line Reactors for proposed Lower Subansiri - Biswanath Chariali 400kV 2xD/c lines are presently available at Biswanath Chariali substation. As of now, the commissioning of Lower Subansiri HEP is indefinitely delayed, therefore, construction of Lower Subansiri - Biswanath Chariali has been put on hold and accordingly these reactors are not being used at this moment.
- 5.2 It has been observed that voltage at 400kV level at Biswanath Chariali, Balipara & Ranganadi substations remains very high for most part of the day. To maintain the node voltages within IEGC band, numbers of 400 kV lines from Bongaigaon, Balipara, Biswanath Chariali, Ranganadi are usually kept open in off peak hours. There have been instances of tripping of 400 kV lines on overvoltage, which have resulted in near-miss incidents in NER Grid.
- 5.3 It may be mentioned that presently 2x80MVAR Bus Reactors are in service at Biswanath Chariali.
- 5.4 Therefore, in order to assuage this issue of high voltage, it is proposed that two out of four 420kV, 63 MVAR Line Reactors at Biswanath Chariali may be utilized as Bus Reactors. This will help to contain the issue of continuous high voltage.

5.5 Members may discuss.

6.0 Installation of 80MVAR Bus Reactor at Ranganadi (NEEPCO) with GIS Bay – Agenda by NEEPCO

- 6.1 To address high voltage at 400kV level at Ranganadi, installation of 80MVAR bus reactor at Ranganadi by NEEPCO was agreed in 5th Standing Committee Meeting of NER held at Imphal on 08-08-15.
- 6.2 But due to space constraints, it is now proposed to install the 80MVAR Bus Reactor at 400kV Ranganadi Bus with GIS bays instead of AIS by NEEPCO.

6.3 Member may discuss.

7.0 Replacement of existing 220/132kV, 4x33.33 MVA Single phase unit transformers by 220/132kV, 1x160MVA 3-phase unit and augmentation by another 1x160 MVA transformer and other works at 220/132kV Dimapur (PG) substation

7.1 At present, the transformation capacity of the 220/132 kV Dimapur (PG) substation is 2x100 MVA. One of the transformer unit is having 220/132kV, 4x33.33 MVA single phase units, which is about to complete 25 years of age. The load requirement of Nagaland is expected to be about 150MW at Dimapur, 30MW at Kohima and 80MW for Assam at Bokajan. All the above mentioned areas are catered through 220/132kV Dimapur (PG) substation.

7.2 Maximum loading on 2x100MVA ICTs has been observed to be 100MW. However, keeping in view future load growth it is proposed to replace the existing 220/132kV, 4x33.33MVA single phase unit transformers by 220/132kV, 2x160MVA 3-phase unit for capacity enhancement. Thus, the final transformation capacity would be 220/132kV, 1x100MVA + 2x160MVA.

7.3 The above proposal has already been discussed and approved in the 16th NERPC meeting held on 29th – 30th Jan 2016. Additionally, in view of completion of 25 years of Dimapur S/s, upgradation of substation from AIS to GIS (SAS) with following scope of works has been approved in the 16th NERPC meeting:

(a) *Replacement of existing 4x33.33MVA, 220/132kV Single phase unit transformers by 2x160 MVA, 220/132kV 3-phase unit for capacity enhancement.*

(b) *Conversion of 132kV Bus Bar Scheme from Single Main and Transfer to Double Main GIS along with future provision.*

(c) *Conversion of 220kV Switchyard from AIS to GIS to accommodate additional transformer and also creation of space for future provision.*

7.4 In addition to the scope mentioned above, provision of tertiary loading for auxiliary supply from 160MVA ICT is also proposed.

7.5 Thus, following is proposed to be implemented at Dimapur substation by POWERGRID:

(a) Replacement of existing 4x33.33MVA, 220/132kV Single phase unit transformers by 2x160 MVA, 220/132kV 3-phase unit for capacity enhancement. Thus, the final transformation capacity would be 220/132kV, 1x100MVA + 2x160MVA.

(b) Conversion of 132kV Bus Bar Scheme from Single Main and Transfer to Double Main GIS along with future provision.

(c) Conversion of 220kV Switchyard from AIS to GIS to accommodate additional transformer and also creation of space for future provision.

(d) Provision of tertiary loading for auxiliary supply from 160MVA ICT

7.6 Members may discuss.

8.0 LILO of 132 kV Jiribam (PG) – Aizwal (PG) line at Tipaimukh substation (MSPCL) – Agenda by MSPCL

8.1 Manipur State Power Company Limited (MSPCL) vide their letter no.14/6(SCM)/GM(PD)2016-MSPCL/2451-52 has informed that in view of power for all by 2019 programme, intensive electrification works of villages in Tipaimukh sub division of Churachandpur district is being taken up under RGGVY and DDUGJY. At present, power supply of Tipaimukh area is fed through 11 kV feeder from 33/11 kV substation at Thanlon (MSPCL) which is around 120km away from Tipaimukh and partly from 33/11 kV S/S at Shivapurikhal through long 11 kV lines. Further, 33/11 kV Thanlon (MSPCL) is 150km away from the nearest feeding point of 132/33 kV substation at Churachandpur (MSPCL). The area experiences very low voltage. MSPCL has taken up the construction of 2x12.5 MVA 132/33 kV S/s at Tipaimukh. Construction of new line from Jiribam (PG) or Churachandpur (MSPCL) is not possible because of involvement of forest and RoW problem. The line is presently carrying about 20 MW, which is going to reduce further after the commissioning of Silchar – Melriat 400 kV D/c (initially operated at 132 kV).

8.2 Further, 132 kV Jiribam (PG) – Aizwal (PG) line owned by POWERGRID passes through Tipaimukh area. Therefore, it is proposed to construct LILO of 132 kV Jiribam (PG) – Aizwal (PG) line at 132/33 kV, 2x12.5 MVA substation at Tipaimukh (Manipur) by MSPCL.

8.3 Members may discuss.

9.0 Installation of 132/33kV Transformers for station supply at Jiribam, Aizawl, Kumarghat and Haflong Sub Stations during upgradation to GIS as approved in 16th NERPC Meeting

9.1 Jiribam, Aizawl and Haflong are 132kV switching-stations and Kumarghat is 132/33kV 5MVA substation of POWERGRID, which have completed 25 years of service.

9.2 Up-gradation of these 132kV substations of POWERGRID viz. Jiribam, Aizawl, Kumarghat and Haflong from AIS to GIS with incorporation of Double Bus Arrangement, LBB & Bus Bar Protection has been approved during 16th NERPC meeting held on 30-01-2016 at Guwahati. On conversion to GIS, more space would be created at these sub-stations for future expansion.

9.3 These substations are part of the 132kV back-bone of the transmission system in NER and considering remoteness of these stations with poor availability of Auxiliary Power, it is proposed to install 132/33kV transformer in said stations during up-gradation. Subject 132/33kV ICTs shall be utilized to feed local loads as well as provide reliable auxiliary power supply at these substations.

9.4 Present status of auxiliary Supply for the substations are as follows:

- **Jiribam Substation :-**
 - Only one Source for Auxiliary Power through two transformers owned by Manipur: 11kV/415V, 250 kVA + 100 kVA.
 - Supply is not dedicated.
 - Station DG Set is of 125kVA Capacity.

- **Aizawl Substation:-**
 - Only one Source for Auxiliary Power through one transformer owned by Mizoram: 11kV/415V 250 kVA.
 - Supply is dedicated.
 - Station DG Set is of 63kVA Capacity.

- **Kumarghat Substation:-**
 - Only one Source for Auxiliary Power through two transformers: 33kV/415V, 630kVA (owned by POWERGRID) and 11kV/415V, 315kVA.
 - 33kV and 11kV lines are not dedicated for Auxiliary Power.
 - Station DG Set is of 125kVA Capacity.

- **Haflong Substation:-**
 - Only one Source for Auxiliary Power through one transformer owned by POWERGRID: 33kV/415V, 160kVA.
 - Supply through 33kV line is not dedicated.
 - Station DG Set is of 63kVA Capacity.

9.5 Thus, following is proposed to be implemented by POWERGRID:

- (a) Up-gradation of Jiribam, Aizawl, Kumarghat and Haflong substations of POWERGRID from AIS to GIS with incorporation of Double Bus Arrangement, LBB & Bus Bar Protection and associated works.
- (b) Installation of 132/33kV, 10MVA transformer each at Jiribam, Aizawl, Kumarghat and Haflong substations to feed local loads as well as provide reliable auxiliary power supply.

9.6 Member may discuss.

10.0 High Capacity India-Bangladesh AC Corridor and Formation of second 400kV node in NER-ER Corridor

10.1 In the 5th Standing Committee Meeting of NER, it was informed that at present, the ER-NER corridor is connected mainly through 400/220kV Bongaigaon S/s. In case of any eventuality at Bongaigaon S/s, there is no second in feed to NER from NEW grid. Therefore, it was agreed that there is a need for 2nd 400kV AC node for interconnection with national grid. The same

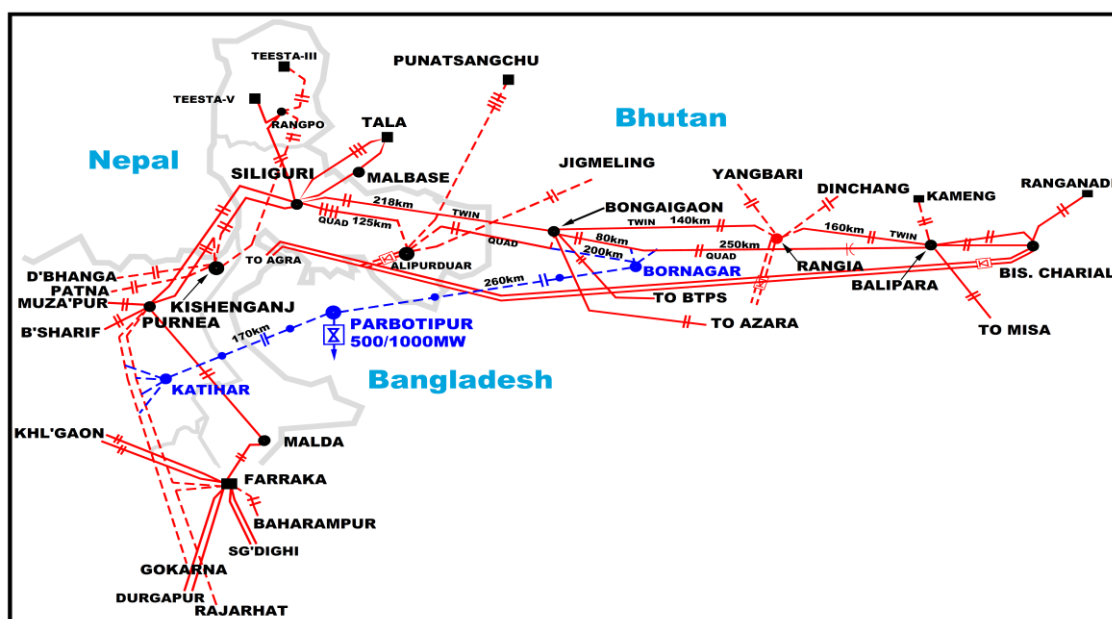
has been taken into account while planning new interconnection between India and Bangladesh.

- 10.2 The new interconnection between India and Bangladesh has been planned with high capacity AC link (765kV line to be initially operated at 400kV) [in place of earlier planned HVDC bipole line connecting Rangia (NER) – Barapukuria (Bangladesh) – Muzaffarnagar (NR) 7000MW HVDC bipole line with 1000MW terminal at Barapukuria] to interconnect Bangladesh with Eastern Region (ER) as well as North Eastern Region (NER). The scheme has been discussed in the 11th India-Bangladesh JSC/JWG meeting held on 13th July 2016. The scheme consists of establishment and interconnection of following substations in NER, ER and Bangladesh.

In NER: In view of space problem at Bongaigaon substation and to provide a reliable take off point in NER, it was proposed to establish new 400 kV substation (to be upgraded to 765kV level in future) at Bornagar in Assam, about 50 km away from Bongaigaon, through LILO of Bongaigaon – Balipara 400kV D/c (quad) line and extension of Alipurduar-Bongaigaon 400kV D/c line to Bornagar substation. Bornagar substation would also act as alternative in-feed to NER in addition to Bongaigaon.

In ER: A new 400kV substation (to be upgraded to 765kV level in future) was proposed as a probable take-off point at Katihar (near Purnea) in ER through LILO of both ckts of Rajarhat-Purnea D/c line (one ckt via Gokarna and other ckt via Farakka).

In Bangladesh: A new 400/230kV substation at Parbotipur (to be upgraded to 765kV level in future) was proposed for the drawl of power by Bangladesh. The proposed interconnection has been planned to connect Parbotipur in Bangladesh to Katihar in Eastern Region and Bornagar in North Eastern Region through 765kV D/c line to be initially operated at 400kV for supply of 500MW power to Bangladesh in Phase-I.



Bangladesh will draw the power at Parbotipur through HVDC back-to-back.

In Phase-II, this interconnection would be upgraded to 765kV for transfer of about 1000MW power to Bangladesh along with upgradation of associated AC substations and augmentation of HVDC terminal at Parbotipur with another block of 500MW.

10.3 Accordingly, the following scope of work is proposed:

Phase-I

Indian Side:

- New 400kV substation (upgradable to 765kV at a later date) at Bornagar (Assam) with LILO of Balipara - Bongaigaon 400kV D/c (quad) line.
- Disconnection of Alipurduar-Bongaigaon 400kV D/c (quad) line from Bongaigaon and extension of the same to Bornagar with 400kV D/C (quad) line so as to form Alipurduar-Bornagar 400kV D/c (quad) line.
- New 400kV substation (upgradable to 765kV at a later date) at Katihar (Bihar) with LILO of both ckts of Purnea - Rajarhat 400kV D/c (triple snowbird) line (one ckt via Gokarna and other ckt via Farakka).
- Katihar (ER) - Parbotipur (Bangladesh) - Bornagar (NER) 765kV D/c line to be initially operated at 400KV

Bangladesh Side:

- 1x500MW, HVDC Back-to-back converter station at Parbotipur

Phase-II

Indian Side:

- Upgradation of Katihar and Bornagar substations from 400kV to 765kV
- Operation of Katihar - Parbotipur - Bornagar 765kV D/c line at its rated voltage
- Other system strengthening in ER and NER (to be identified at alter date)

Bangladesh Side:

- Augmentation of HVDC back-to-back substation at Parbotipur (Bangladesh) by another 1x500MW (total 2x500 MW) block
- Upgradation of Parbotipur substation from 400kV to 765kV

10.4 Detailed scope of works is at Annexure-1 and the report on the feasibility of additional interconnection between India and Bangladesh is enclosed at Annexure-2.

10.5 POWERGRID may present.

10.6 Member may discuss.

11.0 Establishment of 400/220 kV S/s at Rangia and requirement of 2 no. 220kV additional line bays for Assam

- 11.1 In the 5th Standing Committee Meeting of NER, the proposal for establishment of 2x500 MVA 400/220 kV S/s at Rangia by LILO of both circuits of Balipara-Bongaigaon 400kV D/C (twin moose conductor) line along with 2x80MVAR bus reactors was agreed to be implemented by AEGCL. The proposed 400kV S/s at Rangia was meant to feed both the existing Rangia 220kV S/s and new Amingaon 220kV S/s of AEGCL.
- 11.2 As part of “Transmission system for Phase-I generation projects in Arunachal Pradesh”, implementation of new 400/220kV, 2x500 MVA substation at Rangia/Rowta in Assam along with LILO of both circuits of Balipara-Bongaigaon 400kV D/C (Twin Moose) line has been taken up for implementation as part of ISTS through TBCB route.
- 11.3 Therefore, AEGCL has deferred implementation of proposed 400kV substation at Rangia and shall utilize new ISTS substation at Rangia/Rowta to feed both existing Rangia 220kV S/s and new Amingaon 220kV S/s through LILO of both circuits of Rangia-Amingaon 220 kV D/C line.
- 11.4 Assam has informed that they are upgrading their existing 132/33kV Rowta substation to 220kV level and plan to interconnect Rowta (AEGCL) S/s to proposed 400/220kV ISTS S/s at Rangia/Rowta. Hence, Assam has requested for 2 no. of 220kV line bays at Rangia/Rowta 400/220kV ISTS S/s for Rangia/Rowta (400/220kV) – Rowta (AEGCL) 220kV D/c line.
- 11.5 Members may discuss.

12.0 Downstream 220kV or 132kV system development by STUs from the various commissioned and on-going ISTS substations

- 13.1 In the last SCM, four 132kV bays were approved for drawl of power from each Surajmaninagar and P. K. Bari substations under NERSS-V. However, Tripura had indicated utilisation of only two 132kV bays each at Surajmaninagar [for Surajmaninagar (TSECL) – Surajmaninagar (TBCB) 132kV D/c high capacity/HTLS (equivalent of single moose) line] and P. K. Bari [for P. K. Bari (TSECL) – P. K. Bari (TBCB) 132kV D/c high capacity/HTLS (equivalent of single moose) line] substations. TSECL is requested to inform about utilisation of other two 132kV line bays at both substations.
- 13.2 Further, under NERSS-VI four 220kV bays were approved for drawl lines at New Kohima substation. Nagaland had indicated utilisation of only two 22kV bays [for New Kohima (400/220 kV TBCB) – New Kohima (220/132kV - Nagaland) 220kV D/c line with high capacity / HTLS conductor equivalent to twin moose]. Nagaland is requested to inform about utilisation of other two 220kV line bays at New Kohima substation.

13.3 Further, as part of NERSS-III scheme, along with installation of 2nd 400/220kV 315MVA ICT at Bongaigaon substation, 2 nos. of 220kV line bays at Bongaigaon S/s for termination of additional 220kV lines for drawal of power by Assam / Meghalaya are being constructed. Assam/ Meghalaya may update plan / status of construction of subject line.

13.4 Accordingly, list of ISTS sub-stations under various stages of implementation for which downstream network is to be implemented in matching time-frame by respective state utilities is given below. State utilities are requested to update the status and commissioning schedule of the same.

Sl. No	ISTS S/s	Voltage ratio, Trans. Cap	Voltage level (kV)	Total No of Bays	Lines emanating from S/s	No. of circuit	Status of Lines	Remarks
1	Biswanath Chariali	400/132kV, 2x200MVA	132	2 - Existing	Biswanath Chariali- Pavoi	2	Existing	NERSS-II-B
				2 - Under Board Approval	Biswanath Chariali – Itanagar	2	Under TBCB	
2	Bongaigaon	400/220kV, 1x315MVA +1x315MVA	220	4 - Awarded	Bongaigaon-Salakati	2	U/C by POWERGRID	NERSS-III (Exp. Comm. Dec 2017)
					Not identified	2	State to update	
3	Surajmaninagar	400/132kV, 2x315MVA	132	4 - To be awarded	Surajmaninagar (TSECL) – Surajmaninagar (TBCB)	2	State to update	NERSS-V
					Not identified	2	State to update	
4	P. K. Bari	400/132kV, 2x315MVA	132	4 - To be awarded	P. K. Bari (TSECL) – P. K. Bari (TBCB)	2	State to update	NERSS-V
					Not identified	2	State to update	
5	New Mariani	400/220kV, 2x500MVA	220	4 (AEGCL scope)	New Mariani – Mariani	2	State to update	NERSS-VI
					New Mariani - Samaguri	2	State to update	
6	New Kohima	400/220kV, 2x500MVA	220	4 - To be awarded	New Kohima (TBCB) – New Kohima (Nagaland)	2	State to update	NERSS-VI
					Not identified	2	State to update	

7	Rangia	400/220kV, 2x500MVA	220	4 - To be awarded	Rangia (TBCB) – Rangia (Assam)	2	State to update	Trans. Sys. for Phase-1 IPPs in Arunachal Pradesh
					Rangia (TBCB) - Amingaon (AEGCL)	2	State to update	

~~13.4~~13.5 POWERGRID may present.

~~13.5~~13.6 Members may discuss.

14.0 Mismatch of network at the time of DOCO

14.1 CERC vide some of its recent orders has strongly commented against assets mismatch noticed at the time of declaration of DOCO & has advised the following:

"In case of cost plus, the mismatch between Generation / Downstream network / Upstream network, Transmission licensee will not burden the consumers and the charges would be compensated through the IA between the parties".

CERC vide its orders has not included such assets in PoC and in cases of declaration of DOCO, it has been directed to recover transmission charges from concerned Generator / STU / Discoms.

14.2 Further, following has been mentioned in the CERC (IEGC) (Fourth Amendment) Regulations, 2016, dated 6/4/16 under 5.4. Proviso (iii):

"Where the transmission system executed by a transmission licensee is required to be connected to the transmission system executed by any other transmission licensee and both transmission systems are executed in a manner other than through tariff based competitive bidding, the transmission licensee shall endeavour to match the commissioning of its transmission system with the transmission system of the other licensee as far as practicable and shall ensure the same through an appropriate Implementation Agreement."

14.3 Keeping above in view, STUs are requested to ensure utilization of the 220/132kV line bays and also sign the implementation agreement for same.

14.4 POWEGRID to provide list of assets / schemes for which IA is required to be carried out with DICs.

15.0 Construction of 2nd 220kV bay at Balipara (PG) 400/220/132kV S/s by AEGCL for Balipara – Samaguri 220kV D/c line

15.1 AEGCL (Assam) had planned construction of a substation at Tezpur along with Samaguri – Tezpur 220kV D/c line and POWERGRID was to construct Balipara (POWERGRID) – Tezpur 220kV D/c line. The two transmission lines were constructed; however, Tezpur S/s could not be constructed by AEGCL. Thus, the two lines were joined to form Balipara – Samaguri 220kV line. Further, both circuits of Balipara – Samaguri 220kV D/c line are bunched and connected to one 220kV line bay at Balipara end. The Balipara – Samaguri 220kV D/c line is being LILoed at under-construction Sonabil S/s (AEGCL) by AEGCL. In this regard, a meeting was held on 09-10-2015 at CEA, New Delhi for construction of 2nd 220kV line bay at Balipara end for termination of Balipara – Sonabil – Samaguri 220kV D/c line into separate bays. Following decisions were taken in the above meeting:

- (i) AEGCL shall construct a 220kV bay at Balipara (POWERGRID) S/s for termination of one ckt of Balipara – Sonabil/Samaguri 220kV D/c line at its own cost. The bay would be constructed as per the standards and practices followed by POWERGRID.
- (ii) POWERGRID will carry out the O&M of the 220kV bay at Balipara on behalf of AEGCL. AEGCL will enter into necessary agreements with POWERGRID for the same.

15.2 Members may note.

16.0 POWERGRID works associated with North-Eastern Region Strengthening Scheme-VI (NERSS-VI)

16.1 In the last Standing Committee Meeting of NER held on 8th Aug 2015, following transmission elements have been decided to be implemented under NERSS-VI scheme:

NERSS-VI - TBCB:

- (i) Establishment of 2x500 MVA 400/220kV S/s at New Kohima along with 4 no. 400kV line bays, 2x125 MVAR bus reactor and 4 no. 220kV line bays
- (ii) Imphal – New Kohima 400kV D/C line
- (iii) New Kohima – New Mariani 400kV D/c line

NERSS-VI - POWERGRID:

- (i) 420kV, 1x125 MVAR bus reactor (2nd) at Imphal (PG)
- (ii) Up-gradation of New Mariani substation to 400/220kV with 2x500MVA transformer along with associated bays
- (iii) 2 no. 400kV line bays at New Mariani for termination of Misa-New Mariani 400kV D/c at 400kV (existing line operated at 220kV)
- (iv) Termination of Misa-New Mariani section of existing LILo of Kathalguri-Misa 400 kV D/C line (circuit-1) (op. at 220 kV) at New Mariani from 220 kV to 400 kV

- (v) Disconnection of Kathalguri - Mariani (AEGCL) - Misa line from Mariani (AEGCL) S/s and LILO of the same at New Mariani (POWERGRID) with Misa-New Mariani section connected at 400kV and Kathalguri – New Mariani section connected at 220kV at New Mariani
- (vi) 2 no. 400 kV line bays (GIS) at Misa for termination of New Mariani – Misa 400kV D/c line at 400kV (existing line operated at 220kV)
- (vii) * Operation of New Mariani – Misa 400kV D/c line (presently charged at 220kV) at 400kV along with termination at Misa at 400kV
- (viii) Operation of New Mariani – Kathalguri 400kV D/c line (presently charged at 220kV) at 220kV
- (ix) # 2 no. 125MVAR 420kV Bus Reactors at New Mariani
- (x) 2 no. 400kV line bays at Imphal (PG) S/s for termination of Imphal – New Kohima 400kV D/c line (line under TBCB)
- (xi) 2 no. 400kV line bays at New Mariani S/s for termination of New Kohima – New Mariani 400kV D/c line (line under TBCB)

Note:

Provision of bus reactors at New Mariani 400/220 kV substation was inadvertently missed while planning the subject scheme. Accordingly, in order to control the voltage profile, it is proposed to install 2 nos. 125 MVAR, 420kV bus reactors at New Mariani 400/220 kV sub-station.

* 2 nos. 420kV, 50MVAR fixed line reactors installed at Misa end of the line are also required to be charged at rated voltage level of 400kV.

- 16.2 The subject scheme is being implemented through TBCB. RfP of the project has been issued on 02nd Aug 2016. Considering about 3 to 4 months of processing time from RfP to transfer of SPV, the time schedule for implementation of scheme under TBCB works out to be April/May 2020 (3-4 months + CERC time-line of 40 months for 400kV D/c Twin Moose line in Hilly Terrain).
- 16.3 POWERGRID's scope of works at Sl. No. (ii) to (ix) involves upgradation of New Mariani substation of POWERGRID and operation of New Mariani – Misa 400kV D/c line section at its rated voltage. This will form first 400kV substation in Upper Assam area and increase power drawl capacity of Assam (through New Mariani – Mariani 220kV D/c High Capacity line and New Mariani – Khumtai/Samaguri 220kV D/c line). This scope can be implemented early independent of TBCB scheme.
- 16.4 Therefore, it is proposed to commission scope of works at Sl. No. (ii) to (ix) mentioned above by POWERGRID at the earliest.
- 16.5 Members may discuss.

17.0 Utilization of 132/33kV, 10MVA ICT released from Nirjuli substation as regional spare

- 17.1 As part of NERSS-II (Part-A) scheme, replacement of existing 132/33kV 2X10MVA ICT by 132/33kV 2X50MVA ICT at Nirjuli substation has been carried out by POWERGRID.
- 17.2 In the 122nd OCC meeting on the 9th June, 2016 at Guwahati, it was decided that one no. 132/33kV 10MVA ICT at Nirjuli S/s which has become spare after replacement by 132/33kV 50MVA ICT may be kept at Nirjuli substation.
- 17.3 In the 123rd OCC meeting held on 12th July 2016 at Guwahati, Tripura has requested for the use of 132/33kV 10MVA spare ICT kept at Nirjuli by transportation to Gournagar.
- 17.4 TSECL vide its letter date 20-07-2016 has requested CEA for in-principle approval for shifting of the 10MVA transformer from Nirjuli to Gournagar S/S in view of Durga Puja festival.
- 17.5 CEA vide its letter date 02-08-2016 has given in-principle approval for shifting of the transformer from Nirjuli to Gournagar by TSECL in coordination with POWERGRID and bear the cost of transportation and installation of bays at Gournagar.
- 17.6 Members may discuss.

18.0 Loop-in and loop-out on the existing Silchar - Imphal(PG) 400kV D/c line (charged at 132kV) at 400/132kV substation at Thoubal for supplying power to 132kV bus - Agenda by MSPCL

18.1 MSPCL vide their letter no.14/6(SCM)/GM(PD)2016-MSPCL/2451-52 has informed that in order to manage the estimated peak demand of 400 to 500MW in next 4-5 years in Manipur, MSPCL has taken up the construction of 4x105MVA, 400/132kV substation with single phase transformer including one spare at Thoubal along with the construction of 400kV D/c line from Imphal(PG) to Thoubal via Nambol. The works are in advance stage of construction with target completion in October 2016 along with arrangement for power evacuation to different existing 132kV substations from the 132kV Bus at 400/132kV Thoubal substation.

~~18.1~~18.2 With the objective of flexibility and reliability in the management of intrastate power supply system MSPCL intends to energize 400kV Substation at Thoubal. However, the upgradation of 2x50MVA, 132/33kV Substation at Imphal (PG) to 7X105MVA, 400/132kV along with construction of 400kV bays at Silchar substation (GIS) is expected by May 2018.

~~18.2~~18.3 In order to energize the Thoubal S/S at 132 kV, MSPCL has proposed to connect their Imphal (PG)-Thoubal 400 kV D/C line by LILO of one circuit of existing Silchar-Imphal (PG) 400kV D/c line (charged at 132 kV) till the commissioning of 400kV Substation at Imphal (PG). This LILO point is in Konthoujam village at the existing tower location No. 372/0 of Silchar – Imphal (PG) D/C line.

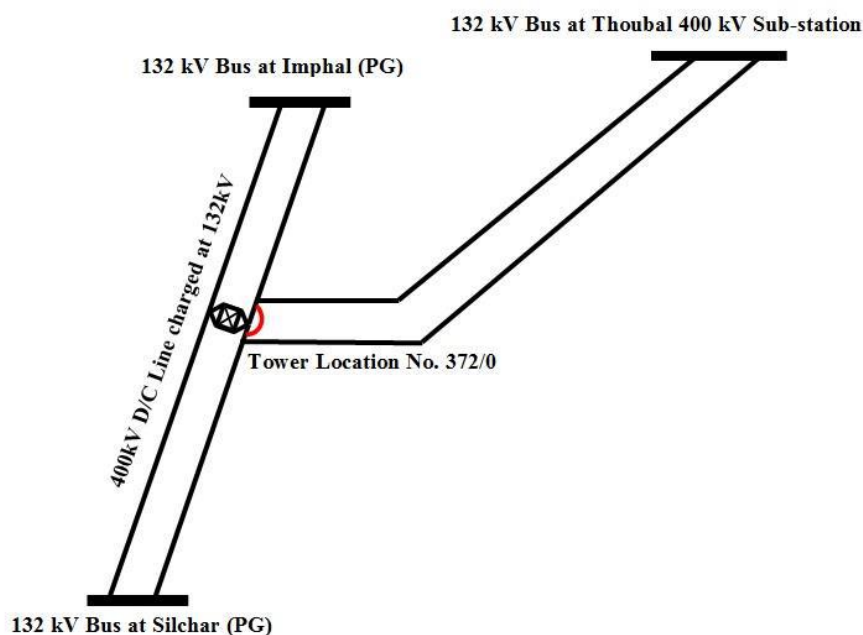


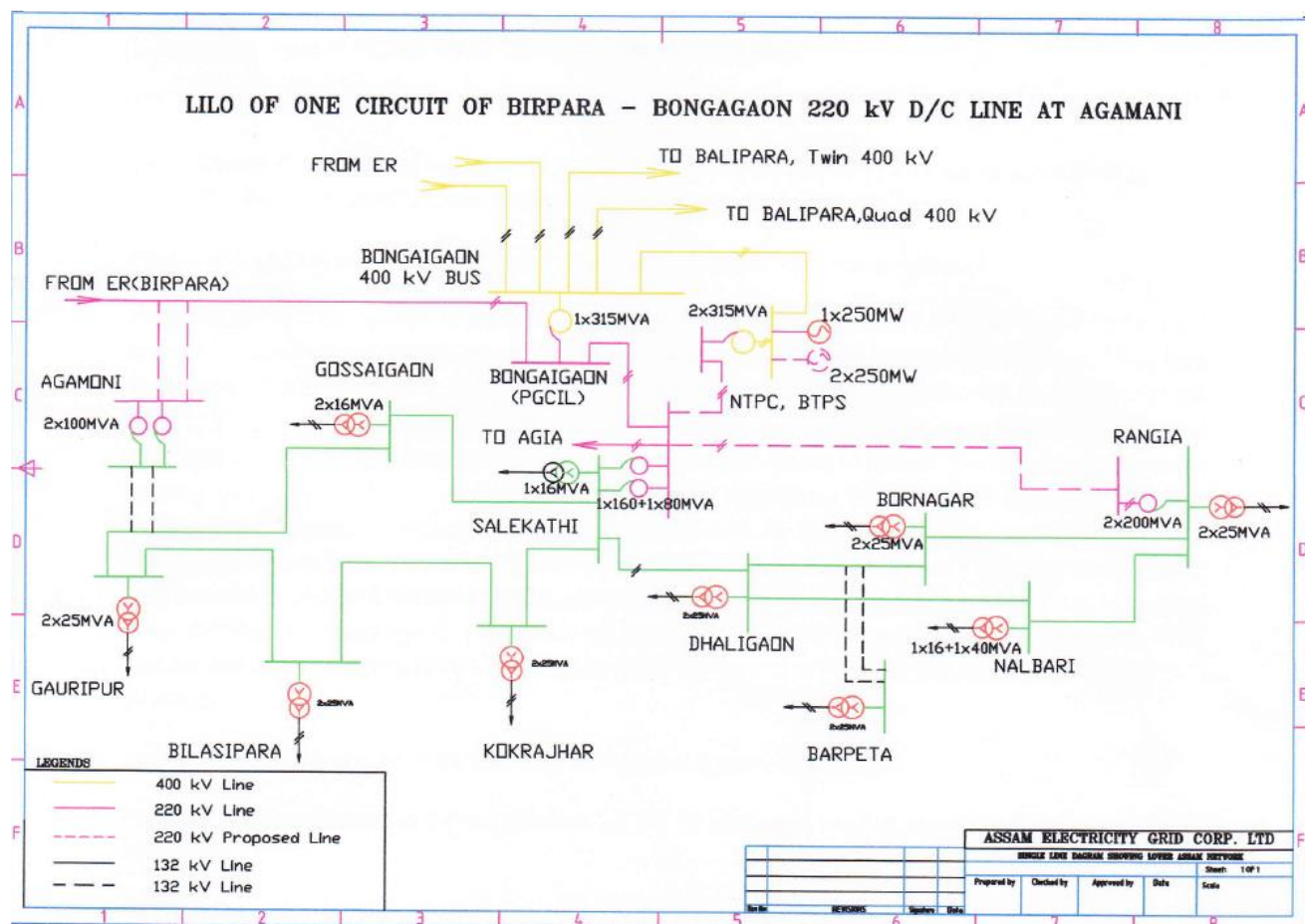
Figure: 400kV Transmission Line

18.3 **18.4** MSPCL has requested approval of Standing Committee for the proposed temporary LILO arrangement by MSPCL.

18.4 **18.5** Members may discuss.

19.0 LILO of one circuit of Birpara – Bongaigaon 220 kV D/c line at Agamoni – Agenda by AEGCL

- 19.1 AEGCL vide letter no. AEGCL/MD/13th Plan/Tech-593/2014-15/6 dated 5th Aug., 2016 has informed that at present, AEGCL has only two numbers of 220/132kV substations in the North Bank of Lower Assam Districts, one is Salekathi 220/132/33 kV and other is 220/132 kV substation at Rangia. The Salekathi S/S is drawing power at 220 kV from 400/220 kV Bongaigaon (PGCIL) S/S and NTPC's BTPS generating stations through the Bongaigaon S/s of PGCIL.
- 19.2 Under NERPSIP, Tranche-1, there will be one more 220/132 kV substation at Amingaon (North Bank of Guwahati City) and will be connected radially to Rangia. The Salekathi substation is catering load of 132 kV to 7 (seven) numbers of 132kV substations i.e. Kokrajhar, Bilasipara, Gauripur, Gossaigaon, Dhaligaon, APM (Jogighopa) and Bornagar, as such, for any outage in 220 kV and 132 kV Salekathi bus, the area fed by the above 132/33kV substations will be out of power.
- 19.3 Agamoni 220/132/33kV, 2x100MVA sub-station, which is in Dhubri district is proposed in the 13th Plan. Its 220kV connectivity is proposed through LILO of one circuit of Birpara/Alipurduar (ER) - Bongaigaon (NER) 220kV D/c line at Agamoni. For evacuation of power at 132kV level, LILO of existing Gossaigaon – Gauripur 132kV S/c line at Agamoni has been planned.
- 19.4 AEGCL has requested the members of the standing committee to approve the proposal.



19.5 AEGCL mat present.

19.6 Members may discuss.

20.0 Transmission system for integration of Solar power projects in Arunachal Pradesh and Nagaland

20.1 A meeting was held in CEA to discuss issues for integration of 100MW solar park at Tezu, Arunachal Pradesh and three solar power parks of total 60MW capacity in Nagaland and to plan transmission system for evacuation of their power into the grid. The meeting was chaired by Member (PS) and participated by representatives of PGCIL (Smart grid), SECI, DNRE (Directorate of New and Renewable Energy) and CEA. There was no representative from MNRE, Electricity department of Nagaland, Electricity department of Arunachal Pradesh and PGCIL (CTU -Plg). Gist of discussions and its outcome are given below.

For Solar Parks in Nagaland:

20.2 SECI informed that 60 MW of Solar Power Projects in Nagaland, is planned to be implemented by DNRE, Nagaland. Regarding the schedule of the project SECI informed that this can be known after they receive the DPR from the project authority i.e. DNRE.

20.3 Jt. Director (DNRE), Nagaland informed that three solar power parks of total 60MW capacity are envisaged at Jalukie, Distt. Peren (30MW), Ganesh Nagar, Distt. Dimapur (20MW) & Zhadima, Distt. Kohima (10MW) in Nagaland in next 2-5 years time frame.

- 20.4 Dir (DNRE) also informed that location of New Peren solar park is shifted to Jalukie town. He also informed that Ganesh Nagar is envisaged to be an industrial growth centre and SEZ in near future.
- 20.5 Dir (DNRE) informed that irradiation level at Jalukie and Ganesh Nagar is higher than that at Zhadima. 75% peak dispatch may be considered at Jalukie and Ganesh and 60% peak dispatch is considered at Zhadima solar parks while evolving the transmission scheme. After discussion, following system was proposed
- 20.6 Proposed transmission system for Jaluki solar park (30MW)
- (i) 33 kV Jalukie solar park – Jalukie 2xD/c interconnection at 33kV level
 - (ii) Charging of Peren – Jaluki – Dimapur line at 132kV level (Please note that this line has been agreed as a part of comprehensive scheme for strengthening of Transmission and Distribution system in Nagaland, to be implemented under Tranche II or III of NERPSIP scheme, to be charged at 33kV level)
- 20.7 Proposed transmission system for Ganeshnagar (Dimapur) solar park (20MW)
- (i) 33KV Ganesh Nagar solar park – Ganesh Nagar D/c interconnection at 33kV.
- 20.8 Proposed transmission system for Zhadima solar park (10MW)
- (i) LILO of 33kV Kohima- Zhadima line at Zhadima solar park at 33kV.
- 20.9 Chief Engineer (CEA) suggested expediting the implementation of 132kV Peren – Jaluki – Dimapur line (S/C on D/C)
- 20.10 As no representative from electricity department of Nagaland was present in the meeting, it was decided that transmission scheme shall be confirmed & finalized after discussion with STU of Nagaland.

For Solar Park in Arunachal Pradesh:

- 20.11 SECI informed that 100 MW of Solar Power Project at Tezu, Arunachal Pradesh, is planned to be implemented by Arunachal Pradesh Energy Development Agency (APEDA). Regarding the schedule of the project, SECI informed that this can be known after they receive the DPR from the project authority i.e. APEDA.
- 20.12 SECI was enquired about that how much yearly peak power would be generated from this project of 100 MW installed capacity. SECI informed that such information would be available in the DPR of this project, which is yet to be prepared. Considering the solar insolation level at Tezu, Arunachal Pradesh, 60-65% peak dispatch may be considered at Tezu, Arunachal Pradesh while evolving its transmission scheme.
- 20.13 PGCIL (Smart grid) informed that Pasighat- Roing- Tezu- Namsai 132kV S/C line on D/C tower, is a part of transmission system for Pallatana GBPP. He suggested that second circuit of this line could be strung for effective evacuation of power from Tezu project. Director, CEA informed that Along- Pasighat 132kV line is under construction by Electricity Department of Arunachal Pradesh and Namsai-Miao-Deomali 132kV S/c on D/c lines is under implementation as a part of Comprehensive scheme for strengthening of Transmission and Distribution system in Arunachal Pradesh to be

developed by PGCIL as Project Management Consultant. It was decided that the implementation of these lines should also be expedited.

20.14 After further discussion, it was decided that detailed load flow would be conducted by PGCIL for evacuation of power from the proposed solar park.

21.0 Construction of 220 kV D/C Transmission line from Dimapur to Zhadima

21.1 NERPC has informed that DoP, Nagaland is undertaking 220 kV D/C Transmission line from Dimapur to Zhadima with 220/132 kV Substation at Zhadima, with funding of Transmission line by DoNER and sub-station by NEC.

21.2 In the process of the survey, it has been found that the transmission line at tapping point at Dimapur requires crossing of inhabited land and marshy river banks leading to very high cost for erection of transmission line.

21.3 DoP, Nagaland reconducted the survey changing the tapping point location to another place located at Kashiram, Dimapur at 220 kV Misa(PG)-Dimapur(PG) line tower location No. 155 or 156. As per the revised survey report the line from the tapping point shall be crossing a little portion of Assam in Nagaland- Assam border behind Rangapahar cantonment Dimapur.

21.4 The proposed line falling under Assam would be around 5.50 km. DoP, Nagaland has requested PGCIL to implement the said portion of the line on deposit work basis.

21.5 NERPC may present.

21.6 Members may discuss.

22.0 LILO of Silchar-Dullavcherra 132 kV S/C line at Halakandi as temporary measure – agenda by NERPC

22.1 NERPC has informed that for evacuation of power from Palatana project LILO of Panchgram-Dullavcherra 132 kV S/C line at Silchar was agreed in the 3rd SCM of NER until Silchar-Halakandi 132 kV D/C line is ready. In view of delay in implementation of Silchar-Halakandi 132 kV D/C line, AEGCL has intimated that they are going ahead with LILO of Silchar –Dullavcherra 132 kV S/C line at Halakandi as a temporary measure for drawing Palatana power from Silchar.

22.2 In this regard, a meeting was held at NERPC on 16-09-16, wherein, it was decided to allow the temporary measure for facilitating Assam to draw power directly from Silchar to Halakandi.

22.3 Members may discuss and approve the temporary measure.

23.0 Signing of Transmission Service Agreement (TSA) by Long Term Transmission Customers (LTTTC) for the transmission scheme North

Eastern Region Strengthening Scheme (NERSS) – VI – Agenda by PFCCL

23.1 NERSS-VI transmission scheme was approved in the 5th the Standing Committee Meeting on Power System Planning of North Eastern Region held on 08.08.2015 at Imphal, Manipur days prior. Ministry of Power vide Gazette Notification dated November 17, 2015 has appointed PFC Consulting Limited (PFCCL) as Bid Process Coordinator for selection of Bidder as Transmission Service Provider (TSP) to establish transmission NERSS-VI through tariff based competitive bidding process. The scope of works covered under the scheme is given below:

- Establishment of 400/220 kV, 2x500 MVA S/S at New Kohima
- Imphal – New Kohima 400 kV D/C line -120 km
- New Kohima – New Mariani 400kV D/C line -110 km

23.2 As per the Guidelines issued by Ministry of Power, a Transmission Service Agreement (TSA) has to signed among the SPV and the concerned beneficiaries / LTTC for payment of the transmission charges finalized on the basis of competitive bidding and accepted by the appropriate Commission. In line with the requirement of the RfP documents, the copy of the duly executed TSA is to be made available to the bidders 7 days prior to the last date of submission of RfP bids i.e. by 23.09.2016. Accordingly, PFCCL vide its letter dated August 18, 2016 has requested to the following 7 nos. LTTC for signing of the TSA.

- i) Department of Power, Arunachal Pradesh
- ii) Assam Electricity Grid Corporation Limited
- iii) Manipur State Power Distribution Company Limited
- iv) Meghalaya Energy Corporation Limited
- v) Department of Power, Govt. of Nagaland
- vi) Department of Power & Electricity, Govt. of Mizoram.
- vii) Tripura State Electricity Corporation Limited

23.3 The status of the bidding process for the scheme as indicated by PFCCL is as under:

- RfQ stage completed on 19th July 2016 and bidders were short listed for participating in the next stage of bidding i.e. RfP.
- RfP documents were issued to the shortlisted bidders w.e.f. August 02, 2016.
- Pre Bid meeting held on September 08, 2016.
- The submission of RfP Bid (Non-Financial & Financial) is scheduled on October 03, 2016.

- The copy of the duly executed TSA is to be made available to the Bidders 7 days prior to the last date of submission of RfP bids i.e September 23, 2016.

23.4 At Present, only 2 LLTCs namely Manipur State Power Distribution Company Limited and Department of Power, Government of Nagaland have telephonically agreed to sign the Transmission Service Agreement by next week.

23.5 In view of above, remaining 5 LTTC are requested to expedite the signing of TSA.

24.0 Modification in scheme for additional ± 800 kV HVDC Corridor in the chicken neck area under North East – Northern/Western Interconnector Project

24.1 Biswanath Chariali – Agra HVDC corridor has been constructed along with three additional corridors in the Chicken Neck area keeping in view the future requirements. The chicken neck area is extremely theft prone and it is not advisable to keep the line without anti-theft charging. Accordingly, it was planned to string conductor on the additional corridors and keep them charged to avoid theft. However, during the course of execution of HVDC transmission line in chicken neck area, it has been observed that anti-theft charging of additional corridors through 132kV line is quite difficult. Further, the additional corridors are crossing the existing 400kV lines in the area.

24.2 However, regulation 44 (6) of CEA (Measures relating to Safety and Electrical Supply) Regulations, 2010 states that “There shall not be tapping of another transmission line from the main line for 66kV and above class of line”.

24.3 With the completion of foundation and tower erection in all three additional routes under chicken neck area, the purpose of occupying corridor has been achieved.

24.4 In view of the above, it is proposed to modify the scope of original scheme by deleting stringing and anti-theft charging of additional corridors. Further, to avoid theft of tower members from erected towers, it is proposed to carry out Tack Welding up to Cross Arm Level.

24.5 POWERGRID may present.

24.6 Member may discuss.

Scope of Works for the scheme
“Interconnection of Northern part of Bangladesh with Indian Grid”

1.0 Indian Side

1.1 Transmission Lines

- (a) Katihar (ER) – Parbotipur (Bangladesh) 765kV D/c line (to be initially operated at 400kV) – Indian Portion only
- (b) LILO of both ckts of New Purnea - Rajarhat 400kV D/c (triple snowbird) line (one ckt via Gokarna and other ckt via Farakka) at Katihar
- (c) Parbotipur (Bangladesh) - Bornagar (NER) 765kV D/c line (to be initially operated at 400kV) – Indian Portion only
- (d) Disconnection of Alipurduar – Bongaigaon 400kV D/c (quad) line from Bongaigaon and extension of the same to Bornagar with 400kV D/c (quad) line so as to form Alipurduar – Bornagar 400kV D/c (quad) line

1.2 Substation

- (a) 400kV new substation at Katihar (Bihar) - upgradable to 765kV later**
 - **400 kV Line bays: 6 nos.**
 - 2 nos. for Katihar (ER) – Parbotipur (Bangladesh) 765kV D/c line to be initially operated at 400kV
 - 4 nos. for LILO of both ckts of Purnea - Rajarhat 400kV D/c (Triple Snowbird) line at Katihar (one ckt via Gokarna and other ckt via Farakka)
 - **Reactive Compensation**
 - 420kV Bus Reactor along with associated bays: 2x125 MVAR
 - Shifting of 2 nos. 420kV, 80MVAR switchable Line Reactors at Purnea end of Purnea – Gokarna/Rajarhat 400 kV D/c (Triple) line from Purnea to Katihar end of Katihar - Gokarna/Rajarhat 400 kV D/c (Triple) line [1.1(b)]
 - **Space for future 765kV switchyard**
 - Space for 765/400kV 3x1500MVA ICTs (10x500MVA Single Phase Units) along with associated bays
 - Space for 765kV Line bays (including space for sw. line reactor): 8 nos.
 - Space for 765kV, 2x330MVAR (7x110 MVAR) Bus Reactors
 - **Space for future 400kV switchyard**
 - Space for 400kV Line bays (including space for sw. line reactor): 6 nos.

- Space for 765/400kV 3x1500MVA ICTs (10x500MVA Single Phase Units) along with associated bays
- Space for 400/200kV, 3x500MVA ICTs along with associated bays
- **Space for future 220kV switchyard**
 - Space for 400/200kV, 3x500MVA ICTs along with associated bays
 - Space for 10 nos. 220 kV line bays

(b) 400kV new substation at Bornagar (Assam) - upgradable to 765kV later

- **400 kV Line bays: 8 nos.**
 - 2 nos. for Parbotipur (Bangladesh) - Bornagar (NER) 765kV D/c line to be initially operated at 400 kV
 - 2 nos. for Siliguri/Alipurduar – Bornagar 400kV D/c (quad) line
[Formed after shifting of Siliguri/Alipurduar – Bongaigaon 400kV D/c (quad) line from Bongaigaon to Bornagar at 1.1(e)]
 - 4 nos. for LILO of both circuits of Balipara - Bongaigaon 400kV D/c (quad) line
- **Reactive Compensation**
 - 420kV Bus Reactor along with associated bays: 2x125 MVAR
 - 420kV, 63MVAR switchable line reactor at Bornagar end on each line of Parbotipur (Bangladesh) - Bornagar (NER) 765kV D/c line to be initially operated at 400 kV [1.1(c)]
 - Shifting of 2 nos. 420kV, 80MVAR Line Reactors from Bongaigaon end of Siliguri/Alipurduar – Bongaigaon 400 kV D/c (Quad) line to Bornagar end of Alipurduar – Bornagar 400kV D/c (Quad) line [1.1(e)]
 - Shifting of 2 nos. 420kV, 63MVAR Line Reactors from Bongaigaon end of Balipara – Bongaigaon 400kV D/c (Quad) line to Bornagar end of Bornagar – Balipara 400kV D/c (Quad) line [1.1(d)]
- **Space for future 765kV switchyard**
 - Space for 765/400kV 3x1500MVA ICTs (10x500MVA Single Phase Units) along with associated bays
 - Space for 765kV Line bays (including space for sw. line reactor): 8 nos.
 - Space for 765kV, 2x330MVAR (7x110 MVAR) Bus Reactors
- **Space for 400kV switchyard**
 - Space for 400kV Line bays (including space for sw. line reactor): 6 nos.

- Space for 765/400kV 3x1500MVA ICTs (10x500MVA Single Phase Units) along with associated bays
- Space for 400/220kV, 3x500MVA ICTs along with associated bays
- **Space for 220kV switchyard**
 - Space for 400/220kV, 3x500MVA ICTs along with associated bays
 - Space for 10 nos. 220kV line bays

2.0 Bangladesh Side

2.1 Transmission Lines

- (a) Katihar (ER) – Parbotipur (Bangladesh) 765kV D/c line (to be initially operated at 400kV) – Bangladesh Portion only
- (b) Parbotipur (Bangladesh) – Bornagar (NER) 765kV D/c line (to be initially operated at 400kV) – Bangladesh Portion only
- (c) LILO of Barapukuria – Bogra 230kV D/c line at Parbotipur

2.2 Substation

- (a) 400/230kV new substation at Parbotipur - upgradable to 765kV later**
- **500MW Back-to-Back HVDC Station**
 - **400kV Line bays: 4 nos.**
 - 2 nos. 400kV line bays for Parbotipur (Bangladesh) – Katihar (ER) 765kV D/c line to be initially operated at 400kV
 - 2 nos. 400kV line bays for Parbotipur (Bangladesh) – Bornagar (NER) 765kV D/c line to be initially operated at 400kV
 - **Reactive Compensation**
 - 420kV, 2x125 MVAR Bus Reactor along with associated bays
 - 420kV, 63 MVAR Switchable Line Reactor at Parbotipur end on each line of Parbotipur (Bangladesh) – Katihar (ER) 765kV D/c line to be initially operated at 400kV [2.1(a)]
 - 420kV, 63 MVAR Switchable line Reactor at Parbotipur end on each line of Parbotipur (Bangladesh) – Bornagar (NER) 765kV D/c line to be initially operated at 400kV [2.1(b)]
 - 400/230kV, 750MVA (4x250 MVA single phase units) ICTs along with associated bays
 - 230kV Line bays:
 - 4 nos. 230kV line bays for LILO of Barapukuria – Bogra 230 kV D/c line at Parbotipur
 - **Space for future 765kV switchyard**

- 765/400kV, 2x1500 MVA ICTs (7x500 MVA Single Phase Units) along with associated bays
- 765kV Line bays: 8 nos.
- 765kV, 2x330 MVAR (7x110 MVAR) Bus Reactors
- **Space for future HVDC / 400kV / 220kV switchyard**
 - 500MW HVDC Back-to-Back 2nd block at Parbotipur
 - 765/400kV, 2x1500 MVA ICTs (7x500 MVA Single Phase Units) along with associated bays
 - Capacity enhancement of 400/230kV Parbotipur substation by 750MVA (3x250MVA single phase ICTs) along with associated bays
 - 400kV Line Bays: 4 nos.
 - 230kV Line Bays: 8 nos. [including 2 nos. line bays for Parbotipur – Bogra – Kaliakoir 400kV (to be energized at 230kV) D/c line]

3.0 Schematic Diagram

